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Dear Mr. Shively and Mr. Taylor,

Many Alaskans, when questioned about Pebble, put their faith in state regulatory agencies and believe the permit process will determine whether the mine can be developed compatibly with the rich salmon spawning and rearing watersheds surrounding it.

Because project data are not collected by regulatory agencies, but are instead collected by consultants hired by and paid by the Pebble Partnership, and raw data are consolidated by the Pebble Partnership prior to submitting it to regulators, it is crucial that regulatory agencies receive information that is thorough and addresses the questions of concern. After reviewing the Pebble Partnership release of Report E: Trace Elements in Sediments and Soils,¹ we conclude that vital information that affects the ability of the public and regulatory agencies to use the information in a meaningful manner is lacking.

Report E provides baseline [pre-operational] data / information on the concentrations of inorganic elements and some organics in site soil and sediments. It is expected that Report E will eventually be integrated with other baseline studies - particularly hydrology, water chemistry, benthics, and fisheries – so that the public might determine likely areas of contamination and potential routes of contaminant migration.

Unfortunately, Report E provides little useful information by itself, and is of little utility in any future report integrations without further information and clarification of presented information. Report E is 106 pages of tables with sample location codes, metal and anion concentrations, and some minimal organics testing. Inadequacies observed in the report include:

- Only 2-3 years of data has been included
- Data is not plotted or summarized in relation to likely location of mine facilities
- Data is not summarized in any meaningful manner
- No Quality Assurance/Quality Control information - no methods or limits of detection provided; unable to determine if duplicate samples or blanks analyzed
- No coordination of sampling by four consulting firms
- Inadequate/limited sampling of organics, sulfur/sulfide, and cyanide forms

¹ Released October 2008, available at http://www.pebblepartnership.com/pages/environment/environment-pre-permitting.php#Report_Series_E

Insufficiencies fell into the general categories of inadequate data collection and inadequate presentation of data for the purposes of a baseline information report.

The sampling coverage was not adequate for the purpose of a baseline report.

1) Only 2 – 3 years worth of data were provided, although between Teck Cominco and Northern Dynasty Minerals, data have likely been collected since the 1980s. Several years worth of data need to be collected to provide statistically valid concentration information.

2) The maps of sample locations did not include likely locations of mine facilities. While these may change prior to actual construction, reviewers need to be aware of the potential locations of critical mine facilities such as tailings dams and waste rock piles in order to assess whether sampling down-gradient has been thorough and adequately characterizes the down-gradient areas. If baseline data itself is intended to guide the siting of facilities, this should be discussed in the report.

3) It would be useful for consultants to provide the actual coordinates of sampling locations in order that readers of future reports can determine whether the same sites have been used by different consultants gathering different data (vegetation, hydrology, etc) and whether the same sites have been used over several years. Several different consulting firms are gathering information, and all use different sample point codes.

4) The Quality Assurance/Quality Control (QA/QC) process is not provided. Did all firms use the same sampling protocols? Did they use the same analytical methods? Did they use the same laboratories for analysis? Were limits of detection consistent? In many places, the number "0" was reported as a concentration, which is scientifically inaccurate and shoddy reporting. Where we observe variations in concentrations at the same location, we are unable to determine if this is a true observation or an artifact of the lab, since no information is provided with regard to duplicate or blank data.

5) Regulators will be unable to draw meaningful conclusions from the data tables without having the sampling summarized statistically, graphically, and by watershed, soil type, and sediment type. The tables of data do not adequately characterize the nature of the samples collected. That is, we do not know how "sediment" is distinguished from "soil". We do not know the depth from which samples were taken. Sample identifications do not clarify whether soil came from uplands or lowlands, talus or moraine, organic rich or organic poor areas; these all have bearing on the resulting composition and any analysis regulators may perform.

With regard to sediments, we are not told whether samples come from ponds, seeps, beaver-impacted areas, rivers, or lakes, and rarely are we provided with information about the organic content or pH, both of which impact the concentration of metals and organics. The scope of pH measurements was minimal; while 30 soil samples from the mine area had pH measured, pH was not measured on any other soil or sediment samples from the mine area, road corridor, port, or lake.

The report should have provided

- Statistical summaries comprising several years of data [n, range, mean, median]
- Graphical summaries, particularly related to location of proposed mine facilities
- Correlations of inorganic and specific organics analysis with total organic carbon content and pH

In addition to the flaws in presentation of data, there are flaws in data collection.

1) In particular, the testing for organics was inadequate. Of the 546 soil and sediment samples from the mine area and the road, only two were tested for GRO. Fuels may contain Residual Range Organics (RRO), Diesel Range Organics (DRO), and BTEX² in addition to GRO. In the mine area, only one sediment sample was analyzed for RRO, DRO, and BTEX, and while 30 mine area soil samples were analyzed for DRO and RRO, none were analyzed for BTEX.

This is in stark contrast to samples from the port and lake, in which all samples collected for trace elements testing were also submitted to full or partial fuel organics analysis.

Along the road corridor, where fuel will be transported and releases will likely occur, only two soil samples were analyzed for RRO and DRO (no GRO or BTEX testing); and although 97 samples of sediment from the road corridor were analyzed for trace elements, none were analyzed for organics. This is inadequate for understanding the range of organics found naturally in order to distinguish anthropogenic releases in the future.

2) Information on cyanide was also inadequate. WAD (weak acid dissociable) cyanide measurements are provided, but we are not told what the label "Cyanide" refers to. Is this "Total Cyanide"? What method is used? Does the method detect both inorganic and organic forms of cyanide? Do these methods determine cyanate and thiocyanate? It can be expected that some cyanide is present in the natural environment, but the profile will likely be quite different than the profile that would present if cyanide was released from mining operations. Inorganic forms are used in mineral processing operations – sodium or potassium cyanide – but in the presence of sulfur may form thiocyanate, which can be toxic to vegetation and aquatic life. A full characterization of the soils should include the natural concentrations of thiocyanate.

3) No information is provided on radioactive elements such as thorium, radium, uranium, gross alpha, or gross beta.

4) Sulfur analysis is minimal. No sulfur, sulfide, or sulfate analyses were performed on soils in the mine pit area or along the road corridor. Based on acid-volatile sulfide (AVS) testing and simultaneous extraction metals (SEM), virtually all trace metals in the soils and sediments that tend to attract to sulfur/sulfide (cadmium, copper, zinc, lead, nickel, mercury) are found as sulfides, indicating that soils may be low in metal carbonates or oxides. This is information regulators may require to analyze potential impacts of the project, including port and road construction.

The report lacked sufficient sampling for

- organics
- sulfides/sulfur
- radionuclides
- cyanide compounds

² BTEX refers to benzene, toluene, ethylene, and xylene, volatile components in fuels.

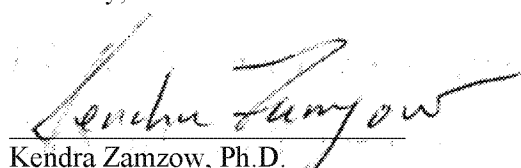
Conclusion

In conclusion, the tables of data presented in Report E are of very limited use in characterizing the trace element and organic nature of soils and sediments in the Pebble Mine footprint. For this report to be meaningful:

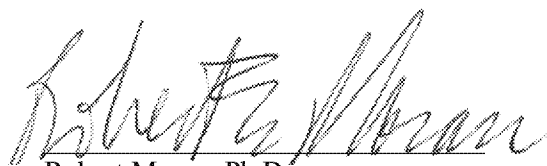
- statistical summaries of all present and past data must be provided
- sampling locations must be clear and meaningful, with
 - clearly marked maps
 - sample location co-ordinates
 - landforms labeled
 - potential locations of mine facilities marked
- concentrations of organics and inorganics need to be correlated with pH and total organic carbon
- further organics, sulfur, and cyanide analysis should be conducted
- important quality control information - such as concentrations in duplicates and blanks, analytical methods, and limits of detection – need to be provided

We are concerned that a pattern of inadequate reporting is being presented on the Pebble Partnership website per Reports B (Surface Water Hydrology), D (Groundwater Hydrology), and E (Trace Elements in Sediments and Soils). We consider it critical to address these deficiencies prior to release of other important information, such as Surface- and Groundwater Chemistry. We also consider it critical to integrate the data/findings of Report E with geochemical testing of the ore, waste rock, and tailings (from mineralogical testing) at some point in the future. Reporting data without context is not meaningful.

Sincerely,



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